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Published in:
BMJ Open

DOI:
10.1136/bmjopen-2018-021732

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2018

Link to publication in University of Groningen/UMCG research database

Citation for published version (APA):
Oosterwold, J., Sagel, D., Berben, S., Roodbol, P., & Broekhuis, M. (2018). Factors influencing the decision to convey or not to convey elderly people to the emergency department after emergency ambulance attendance: a systematic mixed studies review. *BMJ Open*, *8*(8), [e021732]. https://doi.org/10.1136/bmjopen-2018-021732

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BMJ Open

Factors influencing the decision to convey or not to convey elderly people to the emergency department after emergency ambulance attendance: a systematic mixed studies review

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To cite: Oosterwold J, Sagel D, Berben S, *et al*. Factors influencing the decision to convey or not to convey elderly people to the emergency department after emergency ambulance attendance: a systematic mixed studies review. *BMJ Open* 2018;**8**:e021732. doi:10.1136/bmjopen-2018-021732

► Prepublication history and additional material for this paper are available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2018-021732).

Received 16 January 2018
Revised 16 July 2018
Accepted 18 July 2018

Check for updates

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ABSTRACT

Background The decision over whether to convey after emergency ambulance attendance plays a vital role in preventing avoidable admissions to a hospital's emergency department (ED). This is especially important with the elderly, for whom the likelihood and frequency of adverse events are greatest.

Objective To provide a structured overview of factors influencing the conveyance decision of elderly people to the ED after emergency ambulance attendance, and the outcomes of these decisions.

Data sources A mixed studies review of empirical studies was performed based on systematic searches, without date restrictions, in PubMed, CINAHL and Embase (April 2018). Twenty-nine studies were included.

Study eligibility criteria Only studies with evidence gathered after an emergency medical service (EMS) response in a prehospital setting that focused on factors that influence the decision whether to convey an elderly patient were included.

Setting Prehospital, EMS setting; participants to include EMS staff and/or elderly patients after emergency ambulance attendance.

Study appraisal and synthesis methods The Mixed Methods Appraisal Tool was used in appraising the included articles. Data were assessed using a 'best fit' framework synthesis approach.

Results ED referral by EMS staff is determined by many factors, and not only the acuteness of the medical emergency. Factors that increase the likelihood of non-conveyance are: non-conveyance guidelines, use of feedback loop, the experience, confidence, educational background and composition (male–female) of the EMS staff attending and consulting a physician, EMS colleague or other healthcare provider. Factors that boost the likelihood of conveyance are: being held liable, a lack of organisational support, of confidence and/or of baseline health information, and situational circumstances. Findings are presented in an overarching framework that includes the impact of these factors on the decision's outcomes.

Conclusion Many non-medical factors influence the ED conveyance decision after emergency ambulance attendance, and this makes it a complex issue to manage.

Strengths and limitations of this study

- The broad and empirical nature of the study has made it possible to identify multiple factors that influence the referral decision by emergency medical service staff after ambulance emergency attendance, and the outcomes of this decision.
- Building on existing general decision-making frameworks, an overarching framework was developed that proved helpful in structuring the influential factors identified.
- A weakness is that not all of the factors identified can be definitely related to the elderly population because, in many studies, the elderly formed part of a broader study population, and the results were not specified by age group.
- The low methodological quality in some of the studies and the considerable age of some of them are limitations of the study.

INTRODUCTION

Rationale

An increasing demand for emergency medical service (EMS) responses is noticeable in many developed countries.[1–4] The demand is highest with people aged over 65, and exponentially grows with increasing age.[4–7] These elderly people need to get appropriate care after ambulance attendance, and this may not always be referral to a hospital's emergency department (ED). If EMS staff decide that ED attendance is not necessary, the patient can be left at home or referred to another healthcare facility. The possibilities vary by country, and their use is influenced by protocols, protocol adherence and alternative pathways.[8–12] Both the increase in numbers of older people and the demand for EMS set challenges for future patient safety and providing the best possible healthcare.[13]

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Non-conveyance after an emergency ambulance response is an increasing trend in many West-European countries.[14 15] Non-conveyance can partly be attributed to patient refusals, minor injuries that are easy to handle and the death of patients. Incorrect decisions by EMS staff on not to convey patients to the ED can lead to health-threatening situations and even to death.[16–19] Referral to the ED may result in overcrowding and, especially for the elderly population, is associated with higher mortality, delays in receiving critical therapy, patient dissatisfaction, iatrogenic illness, functional decline and adverse events during care.[20–25] Correct conveyance decision-making by ambulance staff is therefore relevant, but also very complex due to the many influencing factors.[26 27] Further, national protocols do not always provide adequate guidance to EMS staff in making conveyance decisions, and guidelines and protocols are not always followed.[12 19 28 29] Reasons for non-adherence to protocols are attributed to the individual professional, the organisation, external factors and protocol characteristics (Grol, cited in Ebben *et al*).[30] Due to the large variety in situations, EMS staff often have to rely on their own professional judgement. Factors such as the use of guidelines and protocols, patient preferences, experience of EMS staff, time aspects and the presence of carers can influence ambulance staff when deciding whether to take a patient to the ED.[31]

Whether EMS staff can adequately determine the medical necessity for an ED evaluation is not easy to define and to measure. A systematic review and meta-analysis showed that there is insufficient evidence to support paramedics determining the medical necessity for ambulance transport.[32] A retrospective analysis of ED data showed that 7.1% of patients aged 75+ taken there by ambulance were considered as non-urgent, with the largest number of non-urgent conveyances following falls.[33] Currently, researchers are focusing on adequate, community-based, alternative referrals by EMS staff for older people who have fallen.[34 35]

National protocols can guide EMS staff in making a decision over the conveyance or non-conveyance of an elderly person after an emergency ambulance call, but these protocols cannot cover the full scope of practice. Other factors also influence the conveyance decision-making process in which negotiation or joint decision-making between EMS staff, the patient and sometimes their family in deciding what is best for the patient can also play a pivotal role.[19 36 37] In the future, the growing ageing population will have major consequences for the utilisation of EMS and so the conveyance decision, to the ED or elsewhere, after emergency ambulance attendance is of growing importance. Insight into factors that influence this conveyance decision-making is especially important for the population of elderly because avoidable admissions may result in functional decline, iatrogenic illness, adverse events, ED overcrowding, excessive interventions and high healthcare costs.[38] To increase knowledge about factors that may influence the conveyance decision for the specific group of elderly vulnerable people, after EMS attendance, there is a need for a full overview of these factors and the impact of the decision.

Objectives

The aim of this study is to provide an overview of those factors that influence the decision whether or not to convey an elderly person to the ED after ambulance attendance and the outcomes of such decisions. The findings will be summarised in a conceptual framework and are intended to inform practice, policy-makers and future researchers. They can also serve as a basis for developing future EMS conveyance decision-making guidelines for vulnerable elderly people, where special attention is paid to minimising the risk of inappropriate conveyance and use of EMS and ED resources, adverse outcomes and medical legal consequences.

METHOD

A systematic mixed-studies review (MSR) was chosen to synthesise primary qualitative, quantitative and mixed-methods research studies.[39] The integrated design selected is appropriate for complex and context-sensitive interventions, and can provide a deep and highly practical understanding of phenomena in the health sciences.[40] This MSR follows recognised guidelines for systematic mixed-studies reviews.[39]

Eligibility criteria

Studies were included if they contained empirical evidence on one or more factors that influenced the conveyance or non-conveyance decision to an ED for an elderly person after being attended by ambulance personnel. In more detail, studies were incorporated if they specifically addressed elderly patients, elderly people were part of a broader age group (eg, all adults), the factors considered could be linked to elderly patients (eg, end-of-life situations, falls) or when general factors were identified that affected all age groups (eg, EMS staff-related factors). Searches were not restricted by publication date or by country, although only publications written in English, Dutch or German were eligible for inclusion. Detailed inclusion and exclusion criteria are provided in online supplementary appendix 1.

Information sources

Three database searches (PubMed, Embase and CINAHL) were executed in October 2016, and these were updated in April 2018 to identify any relevant research published since the initial search. The search terms covered three areas: (1) ambulance or emergency medical services, (2) 'conveyance or non-conveyance of patients' or 'treat and release' or 'referral and consultation', and (3) 'decision-making'. The research team performed a broad search in order to include all the potentially relevant articles, meaning that a high percentage of the initial list would not be relevant. Only peer-reviewed articles were included in order to ensure a generally accepted level

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of quality. The full electronic search strategy is shown in online supplementary appendix 2.

Study selection

In this systematic MSR, the support tool 'StArt'—State of the Art through systematic review—was used in the process of screening for relevant articles.[41] All the articles retrieved (n=2412) were checked by one researcher for duplicates and irrelevant studies, and these were removed; the latter phase employed the exclusion criteria shown in table 1. A second reviewer (MB) independently screened a small random sample (5%), and there was full agreement on the accepted and rejected studies. Two reviewers (JO and DS) independently assessed the full texts of the remaining subset of 108 articles. Cohen's kappa was calculated to determine if there was agreement between the two reviewers. The strength of agreement was considered to be 'good', κ=0.786 (95% CI 0.652 to 0.919), and differences were resolved by discussion. Finally, 29 articles were accepted for inclusion in the systematic literature review (figure 1).

Data collection process

One researcher (JO) extracted data from the included studies. Characteristics extracted included setting, aim of the study, study design and study population (table 1). Data were also extracted describing factors that influenced the conveyance decision after ambulance attendance. A brief summary of these factors and the subjective/objective outcomes of the decision are shown in table 2.

Appraisal

One author (JO) assessed all the included articles and four authors (PR, DS, SB and MB) each assessed some of them using a multimethod appraisal tool (MMAT, version 2011).[39 42] The MMAT has been tested for validity and been used in various systematic MSRs to evaluate the methodological quality by answering four questions regarding recruitment, randomisation (if applicable), appropriateness of outcome measures and attrition rate/completeness of data. The final score reflects the number of criteria satisfied, varying from one criterion met (reported as *) to all criteria met (****). Any disagreements in ratings between reviewers were discussed until a consensus was reached.

Synthesis of results

In this systematic review, a 'best fit' framework was used as a starting point for data synthesis.[43] Since no suitable framework existed for the topic studied, a 'best fit' framework was constructed based on two existing models, one describing the process of clinical decision-making by Gillespie and Peterson and the other, the Input-Process-Output (IPO) model of Steiner and Hackman.[44–47]

The Situated Clinical Decision-Making framework by Gillespie and Peterson is a tool that is often used to assist educators in analysing nursing students, or novice nurses, in their complex and multidimensional clinical decision-making process.[44 45] It can also be applied within EMS practice since these decisions are also made within a dynamic context, knowledge is used from multiple sources, is influenced by all that the profession brings to knowledge and experience and is supported by a range of thinking processes.[44] The themes covered by the Situated Clinical Decision-Making framework were incorporated within an IPO model (figure 2).

Finally, the objective and subjective outcomes are added to the framework. The process of data extraction, coding and analysis in this MSR leads to a conceptual framework that describes the factors that actually influence the decision of conveyance, and the subjective and/or objective outcomes of such decisions.

Patient and public involvement

There was no involvement of patients and or public in this study.

RESULTS

Study selection and characteristics

This systematic literature review covers 29 articles all published between 1995 and 2018 with the majority (n=19) published after 2010. The studies were mostly carried out in the UK (n=13) and the USA (n=12). The four remaining studies were from Sweden, Poland, Australia and Iran. Sixteen of the studies used quantitative research designs, 12 were qualitative and only 1 study used mixed methods. There were eight studies which focused exclusively on elderly people (aged ≥65), and in 10 studies, elderly people were part of a broader age group. In the remaining 11 studies, factors were identified that affected all age groups.

Quality of the studies

Using the quality criteria discussed earlier, four studies were classed as of low quality (* or **),[48–51] 15 as average (***)[52–66] and 10 as good (****).[67–76] Nevertheless, we included all the studies in our analysis but ranked them according to their quality score within the conceptual framework. Ranking was done by taking the average of the MMAT score of the related articles per theme and categorising them as A (≥3 asterisks), B (≥2 and <3 asterisks) or C (<2 asterisks).

Summarising and synthesis

The analysis resulted in a table presenting a priori themes within the 'best fit' framework with the relevant specific factors and a short summary of these factors (table 1). If described in the reviewed papers, the subjective and/or objective outcomes were also presented alongside the specific factors.

Macro-level themes

Governmental, societal and professional themes were identified in the literature that influenced the conveyance decision-making process. One study by Déziel concluded that private EMS services were more likely to convey a patient to the hospital than public EMS services

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Table 1 Characteristics of included studies

Lead author (year), country			Study population						
Setting	Aim	Method	EMS staff (n)	Professional background	Patients (n)	Age range or mean (SD) of patients	Specific elderly population	Quality appraisal MMAT score */****	Short overall critical considerations
Aftyka[51] (2014), Poland The regional Directorate of EMS in Lublin	To compare the actions and referral decisions of nurses and paramedics taken in the field.	QUAN—retrospective observational study. Analysis of ambulance records.	n=992	Pmedics, n=555; RN, n=437.	n=1082	0>90 years.	No	**	Methodological and statistical inconsistencies, making the results and conclusions difficult to interpret. Lacks a statistical power analysis.
Alicandro[49] (1995), USA Four suburban volunteer EMS in Suffolk county, New York	To evaluate the effect of a documentation checklist and online medical control contact on EMS conveyance decisions in patients refusing medical assistance.	QUAN—non-randomised controlled trial. Prospective sequential intervention study.	ND	Volunteer, ALS providers, BLS providers.	n=361	*Phase 1,* 39 (22) years. *Phase 2,* 39 (22) years. *Phase 3,* 41 (20) years.	No	*	Small sample size and the absence of a power calculation; no data on patient enrolment, unclear if all eligible patients were enrolled; results obtained in volunteer EMS, with both BLS and ALS personnel. Generalisability in non-volunteer EMS unclear.
Burrell[52] (2013), UK Ambulance clinicians from South London	To examine the decision-making process of ambulance clinicians in situations of epilepsy.	QUAL—phenomenological study. Face-to-face and topic-guided interviews.	n=15	Pmedic, n=5; EMT 2, n=1; EMT 3, n=4; EmCP, n=1; PTL, n=4.	NA	NA	No	***	Convenience sample may have led to selection bias. No information on saturation in order to determine the qualitative sample size. Awareness of the impact of doing interviews by a colleague.
Burstein[60] (1998), USA Suburban volunteer EMS in Suffolk county, New York	To measure the effect of physician assertiveness on EMS conveyance decisions of patients attempted refusal of medical assistance.	QUAN—cohort study. Prospective analysis of different outcome variables.	ND	Volunteer, ALS providers, BLS providers.	n=130	ND	No	***	No table of patient characteristics included; instrument for measuring assertiveness not validated; the sample was aware of being studied which may cause bias. Generalisability in non-volunteer EMS unclear.
Cooper[53] (2004), UK Westcountry Ambulance NHS Trust	To evaluate the role of emergency care practitioners on the conveyance decision and compare that with the paramedics.	MM—sequential explanatory design. Two stages of data collection: (1) retrospective data analysis, (2) individual and focus groups interviews with ECPs, Pmedics, managers and other staff members.	n=15	ECP, n=4; Pmedic, n=11; ECP and Pmedics mean work experience=8 years.	n=692; 51% males, 49% females.	0–99	No	***	No statistical comparison between ECPs and Pmedics in terms of years of experience. ECPs treated more patients under the age of 16 years compared with the Pmedics (p=0.001).
Ebrahimian[62] (2014), Iran EMS staff working in different districts of Tehran	To explore factors affecting EMS staff's decision about conveyance to medical facilities.	QUAL—phenomenological study. Content analysis with semistructured interviews.	n=18 (males)	Diploma medical emergency (2-year course) or nursing (4-year course). Age: 28–39 years (min–max). Mean work experience=6.61 years.	NA	NA	No	***	Brief description of demographic profile of the respondents. Lack of intercoder reliability which is a crucial component in content analysis. External validity may be impaired because of non-Western culture/country.
Halter[69] (2011), UK London Ambulance Service	To clarify the EMS conveyance decisions, after the use of a clinical assessment tool, in older people who have a fall.	QUAL—phenomenological study. Semistructured interview.	n=12 (7 females, 5 males)	Pmedic, n=1; EMT, n=11. Mean work experience =3.5 years .	ND	ND	Yes, elderly fallers	****	Convenience sample with low experience level of EMS staff.

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Table 1 Continued

Lead author (year), country / Setting	Aim	Method	Study population: EMS staff (n)	Professional background	Patients (n)	Age range or mean (SD) of patients	Specific elderly population	Quality appraisal MMAT score */****	Short overall critical considerations
O'Hara[63] (2015), UK Three ambulance trusts in England	To explore systemic influences on decision-making by paramedics relating to care transitions to identify potential risk factors.	QUAL—multimethod study including a ethnographic study. Two phases of data collection: (1) semistructured interviews, (2) observation, digital diaries, focus groups.	n=88	Pmedic, n=57; SP , n=13; EMT, n=18. Experience EMS staff, <1–20 years.	NA	NA	No	***	Selection on participants is unclear, no information on sampling.
Persse[48](2002), USA City of Houston Emergency Medical Service	To determine if providing follow-up information about non-conveyed elderly patients would change the future decision-making by paramedics.	QUAN—prospective chart review (descriptive study)	NA	Pmedic's	n=260	≥65 years of age	Yes, patients aged ≥65 requested 911 services.	**	Demographic information comparing groups in phase 1, 2 and 3 is missing. Differences between groups may account for any differences in outcomes. Less than 60% being contacted after non-conveyance. No power calculation.
Murphy-Jones[66] (2016), UK English NHS ambulance trust	To explore how Pmedics make conveyance decisions in end-of-life care situations.	QUAL—phenomenological study. Semistructured interviews.	n=6 (3 females,3 males)	Pmedics age, 24–42 years. Work experience range 2–8 years.	NA	ND	Yes, nursing home residents.	***	Small sample size (n=6). Unknown if data saturation is reached. Working experience of Pmedics ≤8 years.
Schaefer[68] (2002), USA King county EMS	To determine if EMS staff could decrease the rate of conveyance to the ED, in patients with no urgent concerns, by identifying and safely triaging them to alternate care destinations.	QUAN—cohort study. Matched historical control group.	ND	EMT and BLS training. Pmedic and ALS training.	n=3633; 45.9% versus 47.4% males.	Range, 0–104, Mdn=33.	No	****	Study took place within BLS response teams. One physician determined the eligibility for alternate destination of care based on predefined criteria. No level of agreement between physicians was measured. The significant difference in destination of care should be interpreted with caution because of the non-randomised study design.
Snooks[75] (2004), UK Two ambulance services in West London	To evaluate the effectiveness of 'treat and refer' protocols.	QUAN—controlled trial without randomisation. Run sheet analysis and analysis of ED and GP records. Follow-up questionnaire of non-conveyed patients.	ND	Pmedics and EMTs	INT, n=788 CON, n=251 , 52% vs 51% males (p=0.69).	Mean age, 54 vs 47 years (p=0.08).	No	****	Power calculation was conducted but was reduced because of lower recruitment to study groups than anticipated. No table of patient characteristics, data reported in text.
Snooks[61] (2005), UK Two ambulance stations in London	To report the views and attitudes of EMS staff in conveyance decision-making in and in a new triage intervention on for non-conveyance.	QUAL—Phenomenological study focus groups.	n=21 (20 males,1 female)	Duration of service, mean (range in years): Focus group 1, 7 (4–16); Focus group 2, 12 (0.5–25); Focus group 3, 8 (4–16).	NA	NA	No	***	Brief description on qualitative data analysis/ coding procedure.
Snooks[55] (2014), UK 9 Ambulance stations across a mixed rural and urban area in the UK	To investigate the effectiveness of a computerised clinical decision support tool for emergency paramedics in conveyance decisions of older people who have fallen.	QUAN—cluster randomised controlled trial.	n=42	Pmedic's .	INT, n=436 CON, n=343	≥65 years. Mdn age INT 83 years CON 82 years.	Yes, older people who have fallen.	***	Study is slightly underpowered.

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Table 1 Continued

Lead author (year), country / Setting	Aim	Method	Study population: EMS staff (n)	Professional background	Patients (n)	Age range or mean (SD) of patients	Specific elderly population	Quality appraisal MMAT score */****	Short overall critical considerations
Stuhlmiller[54] (2005), USA Cleveland EMS	To assess the ability of EMS to determine medical decision-making capacity and in obtaining an informed refusal of transport.	QUAN—retrospective observational study. Analysis of run sheets, non-transport worksheets and associated recorded refusal calls.	ND	Pmedics and online medical command physicians.	n=137	45.9 (22.6), range 0–91	No	***	Calls randomly generated.
Vilke[50] (2002), USA San Diego Medical Services Enterprise	To obtain information and experiences of patients (≥65 years of age) who refused transport by EMS and determine the potential role of online physician–patient contact.	QUAN—prospective observational study, telephone survey and ambulance records analysis.	NA	EMT-Ps, EMT-Ds.	n=100	72.2 (6.4)	Yes, patients aged ≥65 and signed out against medical advice .	**	Telephone survey with possibility of reporting bias. Of the total sample population, 16% of the patients were reached by telephone and agreed (100/636). Data collection tool was not validated.
Waldron[56] (2012), USA Hospital-based ambulance service in New York	To determine if there is an association between EMT gender and the patients decision to refuse conveyance to the hospital by ambulance.	QUAN—case–control study. Retrospective ambulance records analysis.	n=322 Male/male=271 Male/female and female/female=51	EMT-Bs, EMT-Ps.	Refusing medical aid, n= 161; 47.2% male Non refusing medical aid, n=161; 48.4% male	Non-refusal, 53.1 (2.6); Refusal, 53.6 (1.5).	No	***	Data on association and refusal of medical aid rate retrieved after propensity score matching to control for variables.
Waldrop[57] (2015), USA EMS staff from an emergency medical service	To explore and describe how EMS staff assess and manage end-of-life emergency calls.	QUAL—phenomenology in-depth interviews.	n=43, 77% males	Pmedic, n=33; EMTs, n=10; age, 21–65 years, mean 39 (SD11).	NA	NA	No	***	Rigour or the trustworthiness of qualitative data analysis is described. Researcher–participant relationship unclear.
Waldrop[58] (2014), USA EMS staff from an emergency medical service	To identify how EMS providers deal with end of life calls and determine their perceived confidence in managing these situations, and perspectives on improved preparation.	QUAL—cross-sectional survey. Questionnaire.	n=178, 79% males	76 EMT-B, 102 Pmedic. Mean years of working experience 12 (SD 9.5).	NA	NA	No	***	Power analyses was not conducted. Participants were invited to be interviewed.
Zorab[59] (2015), UK South Western Ambulance Service NHS Foundation Trust	To identify how EMS staff assess health information; ascertain if a lack of information could lead to a suboptimal care pathway; explore whether increasing amount of information leads to a more appropriate pathway.	QUAL—cross-sectional survey. Online questionnaire.	n=302, 63% males	EmCP or CCP n=36 Pmedic, n=185 EmCA, student UP, n=58. Most respondents (85.6%) were aged between 26 and 55 years.	NA	NA	No	***	Response rate of 12%.
Déziel[70] (2017), USA Virginia Department of Health Office of EMS	To identify any differences in the transport decision among agency ownership types.	QUAN— retrospective observational study.	NA	Fire-based EMS. Non-fire based EMS. Private organisation non-profit. Private organisation for-profit.	4.6 million	Mean age 52 years.	No	****	Very large dataset.
Langabeer[65] (2016), USA Houston EMS	To compare the effectiveness of an alternative EMS telehealth delivery model relative to traditional EMS care.	QUAN—observational case–control study.	NA	NA	n=287	Mdn age, INT 44 years CON 45 years.	No	***	Case–control study, controls are matched afterwards. Control group not matched on inclusion criteria but on demographic data.
Larrson[71] (2017), Sweden Ambulance organisation of Sweden	To examine early prehospital assessment of non-urgent patients and its impact on the choice of the appropriate level of care.	QUAN—exploratory study based on a consecutive and retrospective review of patient records.	ND	Ambulance nurses.	INT, n=184 CON, n=210	Aged ≥18 years. Mean age, INT 75.4 years CON 74.1 years. Range INT 23–96 years CON 18–98 years.	No	****	Comparison with retrospective control group.

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Table 1 Continued

Lead author (year), country			Study population						
Setting	Aim	Method	EMS staff (n)	Professional background	Patients (n)	Age range or mean (SD) of patients	Specific elderly population	Quality appraisal MMAT score */****	Short overall critical considerations
Noble[72] (2016), UK NHS Ambulance Trusts	To explore the experiences of EMS staff managing patients with seizures.	QUAL—semi structured interviews.	n=19	Pmedic, n=19.	NA	NA	No	****	Independent and experienced interviewer with already validated topic tool.
Porter[64] (2007), UK NHS Ambulance Service Trust	To examine EMS staff's view on how decision-making about non-conveyance works in practice.	QUAL—three focus-group interviews using a topic guide.	n=25	Pmedics, n=25.	NA	NA	No	***	Short and compromised method section. Degree of independence between researcher and group unclear.
Simpson[73] (2017), Australia State-based Australian ambulance service	To explore the decision-making process used by paramedics when caring for older fallers.	QUAL—grounded theory methodology. Semistructured interviews and focus groups.	n=33 (21 males, 12 females)	QP=16, ICP=11, ECP=6 Years of working experience 12 (SD 6)	NA	NA	Yes, older people who have fallen.	****	Data analysis and coding were done by one single researcher (also paramedic), but subjectivity was regularly checked during the analysis and challenged by members of the research team.
Snooks[74] (2017), UK Three UK ambulance services	To determine clinical and cost-effectiveness of a paramedic protocol for the care of older people who fall.	QUAN—cluster randomised trial.	n=215	Pmedics, n=215.	INT, n=2391 CON, 2264	INT 82.54 (7.97) CON 82.14 (8.11)	Yes, aged≥65 years.	****	Self-reported outcome results should be interpreted with caution. Response rate was very low, with high risk of selection bias.
Villarreal[76] (2017), UK West Midlands Ambulance Service	To evaluate the impact of a service development involving a partnership between EMS crew and GPs on reducing conveyance rates to the ED.	QUAN—one group post-test only design.	ND	Pmedics	n=1903	63.1% of study population aged ≥61 years.	No	****	No control group, no data on outcome.
Williams[67] (2018), USA Wake County Emergency Medical Services	To determine whether unnecessary transport can be avoided.	QUAN—Prospective cohort study.	ND	Pmedics	n=840	85.5 (8.3) years.	Yes	****	'Time-sensitive' outcome measures seem to be somewhat random chosen.

ALS, advanced life support; BLS, basic life support; ED, emergency department; EmCP, emergency medical care practitioner; EMS, emergency medical service; EMT 2, emergency medical technician (supervised patient assessment); EMT 3, emergency medical technician (unsupervised patient assessment); GP, general practitioner; MMAT, mixed-methods appraisal tool; NA, not applicable; ND, not described; NHS, National Health Service; Pmedics, paramedics; PTL, paramedic team leader; QUAL, qualitative research; QUAN, quantitative research; RN, registered nurse.

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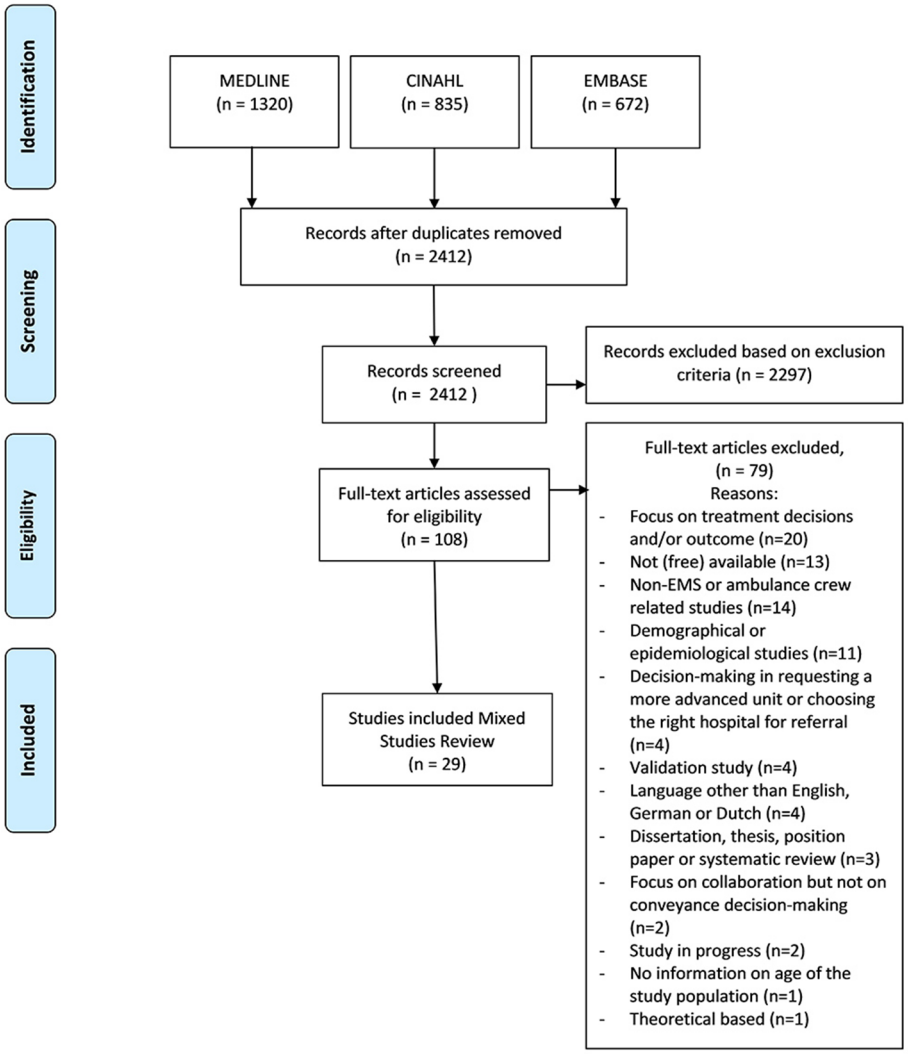

Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram of the selection process. EMS, emergency medical service.

(likelihood of conveyance by private EMS service is 4.5 times greater than with a public service).[70]

Within the society theme, the factor 'Presence or absence of alternative care destinations for low-acuity diagnoses' was mentioned as an important reason for conveyance to the ED.[52 63 68 72] Where there were alternative destinations (other than referral to the hospital), Schaefer *et al* found a decrease in the proportion of non-acuity patients who were referred to the ED relative to a historical control group (51.8% vs 44.6%, p=0.001). No increase in medical morbidity resulted from this reduction in hospital referrals, and the patients with alternative care destinations were satisfied with their care.[68]

Within the profession theme, 'being held liable' was found to be an important factor leading to possibly unnecessary conveyance to the ED.[52 62–64 66] EMS staff feared being held responsible for a patient's welfare, and opted for the safe option of referral to the ED rather than 'treat and release'.

Meso-level themes

Three themes on the meso level had been identified as influencing the conveyance decision after an emergency ambulance call: 'EMS organisational structure', 'availability of appropriate resources and/or persons' and 'workload'. Most of the factors identified were within the 'EMS organisational structure' theme. Four studies[52 63 64 73] reported that low confidence in the organisational support led to decisions reflecting minimising risk and thus conveyance to the ED. Operational demands, such as minimising on-scene time and reducing the number of conveyance rates, were factors in the decision-making process, but were counter-productive. Non-conveyance decisions are often more complex and time consuming and therefore increasing on-scene time.[61 62 72 73]

An important factor within the 'availability of appropriate resources and/or persons' theme is the presence of clear directives or protocols. EMS staff indicated that conveyance protocols could give legitimacy to informal

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Table 2 Data extraction table

	Factors influencing the decision for conveyance	Impact and interplay of the factors	Subjective/objective outcome	References	Cumulative score*
Government					
	Type of organisation, public or private.	Private EMS services are more likely to convey a patient to the hospital than public EMS services (likelihood of conveyance by private EMS service is 4.5 times greater than with a public service).		70	A1
Society					
	Presence or absence of alternative care destinations (for low-acuity diagnoses).	Compared with the preintervention group: ► Smaller proportion of patients in the intervention group received care in the ED (p=0.001). ► Greater proportions of patients in the intervention group received clinic care (p=0.001) or home care (p=0.043). Factors increasing conveyance: ► No safe environment for recovery or absence of investigation and treatment options, if required. ► Lack of access to alternative service and community resources. ► Limited awareness of alternative care options by EMS staff.	5 out of 81 patients were initially referred to an alternative care destination before proceeding on to the ED. No medical morbidity resulted from this delay. Patients who were referred to an alternative care destination were satisfied with their care.	68	A4
	Shift of emergency call profile (from primarily emergency care decisions to primary care and psychosocial care).	► Conveyance decisions after a primary care or psychosocial response are complex and time-consuming, making conveyance more likely.		52 63 72 63	A1
Profession				52 61 63 64 66 69	
	Being held liable.	Potentially increases conveyance rate due to: ► Fear of EMS providers of being held responsible and liable for a patient's welfare. ► Anxiety associated with decisions and potential repercussions when deciding not to convey—conveyance to the ED was considered the 'default safety net'.		52 61 63 64 66 69	A6

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Table 2 Continued

	Factors influencing the decision for conveyance	Impact and interplay of the factors	Subjective/objective outcome	References	Cumulative score*
EMS organisational structure				52 63 64	
	Lack of perceived organisational support/ coverage.	► Less perceived support leads to low-risk decisions, that is, conveyance to the ED. ► Lack of confidence in organisational support after an incident.		52 63 64	A4
	Operational demands.	► Pressure experienced by EMS staff to minimise on-scene time and to reduce conveyance rates (counter-productive performance indicators). ► Non-conveyance decisions: often more complex and time consuming (increased on-scene time). ► Hospital delays impact heavily on EMS staff decision-making. ► Non-conveyance rates go up in situations of extensive hospital delays.		63 64 72 73	A5
	Equipment.	► No access to, or defective, essential equipment leading to conveyance.		62	A1
Workload				61 62	
	Influence of service structure.	► Operational circumstances such as a difficult shift, a busy shift or being at the end of a shift leading to the easiest option, that is, conveyance.		61 62	A2
Availability of appropriate resources/persons				58	

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Table 2 Continued

	Factors influencing the decision for conveyance	Impact and interplay of the factors	Subjective/objective outcome	References	Cumulative score*
	Availability of clear directives or protocols.	► Field-based decision-making without clear directives in end-of-life care is considered problematic and drives up conveyance rates. ► Introduction of T&R protocols did not change the proportion of patients left at the scene (intervention group 93/251 vs control group 195/537, (p=0.9)).	1. Patient satisfaction scores were significantly higher after introducing T&R guidelines: right amount of advice (p=0.04); reassured by the advice (p=0.02); clarity when asking for more help (p=0.03). 2. Patients' satisfaction with EMS crew increased (p=0.02). 3. Median job cycle time was 8 min longer for non-conveyed patients (p<0.0001). 4. 3/93 patients in the intervention group and 3/195 patients in the control group were left at home but should have been taken to the ED.	58 75	A3
		► EMS staff reported increased confidence, job satisfaction and consistency in their assessment and decision-making after the introduction of protocols.		61	
	Provision of objective feedback information.	► Changes in the practice of paramedics when provided with objective outcome data. Paramedics became self-motivated to improve care.	1. No significant difference before and after the intervention in relation to patients who sought medical help and required admission within 24 hours of EMS contact and patient refusals. 2. Patient satisfaction increased after the intervention to 100% (p=0.03).	48	B3
		► Lack of feedback on referral outcome was experienced as frustrating.		69	
		► Limited access to feedback on referral decisions was barrier to individual and organisational learning and improvement.		63	
Personal and role-related factors				51	

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Table 2 Continued

	Factors influencing the decision for conveyance	Impact and interplay of the factors	Subjective/objective outcome	References	Cumulative score*
Knowing the profession	Educational background, competencies and skills.	► Paramedics on their own provided significantly more aid and less frequently conveyed than nurses in a similar position (p=0.000).		51	B5
		► Particular ECPs use a hypothetico-deductive approach to decision-making compared with the pattern-based decision-making approach. ► ECPs were more likely to treat patients at the scene than paramedics (p=0.007). ► The training, competence and confidence of the ECPs seemed to improve their decision-making process, with a significant impact on resources (ambulance use, ED presentations). ► ECPs were more likely to consider the latest evidence in determining their practice.	None of the ECPs' or paramedics' patients who were treated at the scene were subsequently conveyed within 24 hours (one repeat call to an ECP-treated patient who had fallen for a second time). Education and experience in minor injury unit gave the ECPs the competence and confidence to treat patients at the scene.	53 73	
		► Lack of training, development and skill use inhibits the competence and confidence of paramedics in dealing with specific, and especially low acuity, decision-making in cases of non-conveyance.		63 72 73	
	Role perception.	► Individual paramedic perception of what the role of a paramedic is determines the nature the decision-making process. ► Paramedics see themselves as highly trained to manage patients with life-threatening conditions and do not see 'low-acuity' work as their job.		73	A1
Personal and role-related factors				52 61–64 69 72 73	
Knowing the self	Experience and confidence.	► Prior experience or working experience affects conveyance-related decisions.		52 61–64 69 72 73	A9
		► EMS staff must have a high level of confidence and/or experience in dealing with do-not-resuscitate and medical orders for life-sustaining treatment situations.		58	

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Table 2 Continued

	Factors influencing the decision for conveyance	Impact and interplay of the factors	Subjective/objective outcome	References	Cumulative score*
	Gender of EMS staff.	► Male/male teams were 4.75 times more likely to generate an RMA than teams with at least one female (OR 4.75, 95% CI 1.63 to 13.96, p<0.0046).		56	A1
	Health status of EMS staff.	► EMS staff's physical condition affects their decision-making ability. Physical problems may negatively affect EMS staff's concentration, resulting in inadequate conveyance decisions.		62	A1
Personal and role-related factors				56 62 69	
Knowing the case	Adequate knowledge-related to pathophysiology.	► Presence of a serious disease, obvious acute signs and symptoms, and perceived unpredictability of the disease result in transportation to the ED.		56 62 69	A3
Knowing the person/patient	Educational status of patient (or family).	► Communicating and interacting with patient and family members with higher or lower educational status can affect the conveyance decision both positively and negatively.		62	A1
	Mental capacity of the patient.	► Policy and protocols dictate ED conveyance in cases were EMS staff finds the patients incapable of making their own decisions (eg, drinking alcohol).		64	A1
Personal and role-related factors				62	
Knowing the person/patient	Financial status/insurance coverage.	► Those who have better financial status can insist, despite the advice of EMS, on conveyance to ED. Patients in financial problems and no insurance ask to manage their problems at home.		62	B2
		► Financial reasons play a major role in the decision-making in elderly patients after an emergency call.	70% of elderly patients who refuse transport to the hospital received follow-up care, of whom 32% were admitted to hospital. Average rating of paramedic care was 8.1±1.1.	50	

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Table 2 Continued

	Factors influencing the decision for conveyance	Impact and interplay of the factors	Subjective/objective outcome	References	Cumulative score*
	Special patient groups.	Special patient groups, such as: 1. Patients who hold strategic management or administrative positions. 2. Elderly people who live alone. Students who develop problems at school. 3. Culprits and prisoners. 4. Foreigners. These patients have to be conveyed irrespective of the severity or the seriousness of the problem.		62	A1
	Lack of access to background medical information.	► Lack of health information increases likelihood of being conveyed as it is seen as the 'easy option'.		52 57 59 69 72	A5
PROCESS				61 69	
Cues	Intuition/instinct.	► Instinct and intuition, after talking to a patient, were named as factors that influenced the conveyance decision.		61 69	A2
Use of decision support tools	Use of a decision tool.	► In cases of initial refusal, conveyance of high-risk patients to the ED increased after using a high-risk criteria checklist by EMS staff (3% vs 10%). Transport of patients without high-risk decreased (18% vs 5%, significant finding).	Patients with high-risk criteria who were transported to the ED were more likely to be admitted to the hospital than patients who did not have high-risk criteria (48% vs 5%, p=0.03).	50	B3
		► In cases of falls, patients attended by intervention paramedics using computerised clinical support tool were twice as likely to be referred to a fall service (42/436, 9.6%) compared with (17/343, 5.0%); OR 2.04, 95% CI 1.12 to 3.72). Non-conveyance rate was higher in the intervention group (non-significant).	No difference in outcome between intervention and control groups.	55	

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Table 2 Continued

	Factors influencing the decision for conveyance	Impact and interplay of the factors	Subjective/objective outcome	References	Cumulative score*
		► In cases of falls, patients attended by intervention paramedics using a clinical decision flow chart were more likely to be referred to falls services.	There was little difference in the rate of occurrence of serious adverse events between groups. There was no difference in overall healthcare costs at 1 or 6 months. Intervention patients reported higher satisfaction with interpersonal aspects of care.	74	
PROCESS				49 54	
Input of significant others	Consulting (EMS) physician.	► In cases of refusal, phone contact with physician improved transportation to the ED of high-risk patients without increasing the on-scene time (from 3% to 35%, significant finding). ► Transport of patients without high risk decreased (18% vs 0%, significant finding). ► Similar research showed that online contact with physician increased conveyance to the ED (32.1% vs 8.3%, p<0.001).	Patients with high- risk criteria who were transported to the ED were more likely to be admitted to the hospital than patients who did not meet high-risk criteria (48% vs 5%, p=0.03).	49 54	A9
		► 49% of the patients who refused conveyance to the hospital stated that speaking to a physician would influence their decision in favour of transport to the hospital.		50	
		► Difficulty in making contact with (out of hours) GP was a variable that leads to conveyance to the ED.		63	
		► Consulting a novice emergency physician usually leads to the patient being conveyed, while experienced physicians provided constructive advice.		62	
		► Consulting an EMS physician, after EMS assessment combined with a triage tool, leads to 56% absolute decrease in conveyance to the ED (74% control vs 18% intervention, p<0.001).		65	

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	Factors influencing the decision for conveyance	Impact and interplay of the factors	Subjective/objective outcome	References	Cumulative score*
		► Early dialogue between ambulance nurse and a GP, in patients with non-urgent medical conditions, influences the conveyance decision in favour of non-conveyance. GP had access to the medical history of the patient.	Number of non-conveyance was higher in the intervention group (73.9% vs 36.5%, p<0.001). Mean time to return to service was significantly lower in the intervention group (86.88 vs 94.12 min, p=0.004).	71	
		► Elderly are less likely to be conveyed to the ED after EMS assessment combined with a triage tool and GP consultation (telephone advice or face-to-face assessment by GP).	A time-sensitive condition occurred in 2% of the non-conveyed patients after a ground level fall, despite the protocol used (Williams, 2018).	67 76	
PROCESS				63	
	Consulting colleagues or other services.	► Paramedics had positive experiences and relationships with out-of-hours and other services such as falls teams, thereby preventing conveyance to the ED.		63	A1
	Unfamiliarity with enhanced skills and responsibilities by other healthcare professionals.	► Healthcare professionals were unaware of the paramedic's skills and responsibilities making communication and community-based referrals difficult.		63	A1
	Framing crews expectations by dispatcher.	► Information by dispatcher had the potential to inform and frame crew expectations, but this information was often limited and potentially misleading.		63 73	A2
	Views of the patient.	► EMS staff felt that epilepsy patients understood their condition well and were competent to make an appropriate decision once recovered. In cases of end-of-life responses, EMS staff preferred to meet the wishes of the patient if they were capable of deciding.		52 66	A2
Evaluation	No factors found.				
PROCESS				52 57 64	
Judgement	Considering contextual factors.	► In cases where the family were intensely reactive, conveyance was the easiest and safest choice. Bystander expectations leading to conveyance.		52 57 64	A5

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Table 2 Continued

	Factors influencing the decision for conveyance	Impact and interplay of the factors	Subjective/objective outcome	References	Cumulative score*
		► Differences in practice among paramedics in end-of-life emergency responses leading to conveyance of the patient against their perceived best interest.		66	
		► High response times combined with unfavourable emotional atmosphere in patients and family leading to transport to alleviate the situation.		62	
	Presence or absence of carers.	► Presence of adequate care or carers influenced the decision whether to convey or not.		69	A2
		► If the patient had social support and access to a district nurse or GP then crews were more prepared not to take the patient to the hospital.		75	

*Cumulative score=(average of MMAT score of related articles and categorised in A (≥3 asterisks), B (<3 to ≥2 asterisks), C (<2 asterisks) COMBINED with total number of related articles).
ALS, Advanced life support; BLS, Basic life support; CCP, critical care paramedic; ECP, Emergency Care Practitioner; ED, emergency department; EmCA, Emergency care assistants; EmCP, Emergency care practitioner; EMT 2, emergency medical technician (supervised patient assessment); EMT 3, emergency medical technician (unsupervised patient assessment); EMT-P: Emergency Medical Technician Paramedic; EMT-D: Emergency Medical Technician Defibrillation-capable; EMT, emergency medical technician; EMT-B, Emergency Medical Technician Basic; GP, general practitioner; ICP, Intensive Care Paramedic; Mdn, median; MM, Mixed method research; MMAT, mixed-methods appraisal tool; NA, not applicable; ND, not described; Pmedics, paramedics; PS, paramedic specialist; PTL, paramedic team leader; QP, Qualified Paramedics; QUAL; Qualitative research; QUAN, Quantitative research; RN, registered nurse; T&R, treat and refer; UP, unregistered practitioner.

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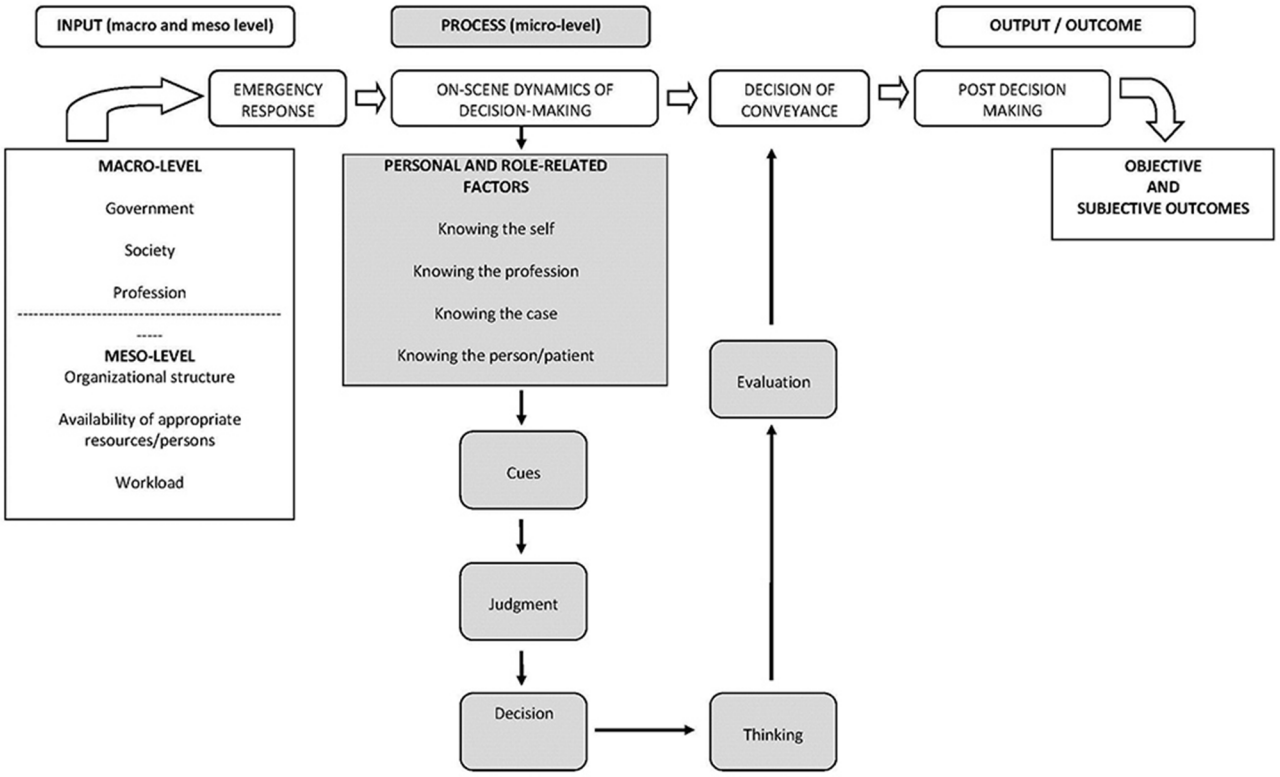

Figure 2 A priori theoretical framework of the decision-making process on conveyance by emergency medical service staff (based on Gillespie and Peterson, Steiner and Hackman).[44 46 47]

practice, but did not necessarily influence conveyance rates.[61] Effects that were reported after the introduction of new guidelines/protocols were: higher patient satisfaction rates,[61] increased mean job-cycle time,[55] better documentation of clinical assessment,[61 75] and increased job satisfaction and confidence of EMS staff.[61] Another factor found within this theme was making use of a 'feedback loop'. When EMS staff were provided with objective feedback information on non-conveyance responses, their self-motivation to improve care increased,[48 63] and this led to individual and organisational learning.[63] Under the workload theme, two studies found that attending incidents during difficult or busy shifts, or at the end of a shift, led to taking the easy option of conveying the patient to hospital.[61 62]

Micro-level themes: dynamics in the decision-making process

The micro level consists of the knowledge that informs EMS staff on the scene, and can be subdivided into six themes: 'personal and role-related factors', 'cues', 'judgement', 'input of significant others', 'thinking' and 'evaluation'.

Theme 1: personal and role-related factors

In terms of personal and role-related factors, decision-making is informed by four knowledge-related aspects: 'knowing the self', 'knowing the profession', 'knowing the case' and 'knowing the person/patient'.

Most of the information uncovered from our review related to the 'knowing the self' aspect. Several factors influence the conveyance decision: their experience and confidence (where experience was reported as more important than training),[58 61 62 64 69 72 73], previous negative experiences,[52 63] gender[56] and the health status of the EMS staff.[62] One study that examined the influence of EMS staff gender on non-conveyance due to patient refusal found that all-male teams were 4.75 times more likely to be confronted with a refusal of medical aid and subsequent conveyance to the ED than all-female and mixed-gender teams.[56]

Educational background, labelled as the 'knowing the profession', also influenced the conveyance decision. It has been reported that paramedics less frequently convey patients to a hospital than nurses.[51] Cooper *et al* and Simpson *et al* reported that patients seen by an emergency care practitioner (ECP), someone who combines extensive nursing and paramedic skills, were less likely to be conveyed to the ED than those seen by paramedics.[53 73] None of the articles investigating this topic provided information on objective outcomes linked to the educational background of the EMS providers. However, Cooper *et al* did note that there was no difference between paramedics and ECPs in terms of non-conveyed patients requiring subsequent conveyance to the ED within 24 hours. Simpson *et al* also reported extensively on paramedic role perception as a factor that influenced decision-making. Many felt that engagement in fall risk assessment or injury prevention did not fall within the scope of their function.[73]

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Adequate pathophysiology knowledge was classified under the 'knowing the case' aspect. Here, recognition of the presence of a serious disease, obvious acute signs or perceived unpredictability of a disease resulted in direct conveyance to the ED.[56 62 69]

Finally, five factors were linked to the 'knowing the person/patient' aspect. Patients with a better financial status were more likely to be conveyed to the ED.[50 62] The majority of the elderly (70%) who were denied conveyance to the ED because of their poor financial status did receive follow-up care, of which 32% were later admitted to a hospital. Furthermore, the 'educational status of the patient' and being a 'special case', such as elderly patients who lived alone, prisoners or foreigners, someone who had become incapable of making his/her own decisions were reported as influencing the conveyance decision.[62 64] Lastly, having access to the medical history and/or baseline health information influenced the conveyance decision. In the absence of such information, conveyance to the ED may be seen as the easiest and safest option.[52 58 59 69 72]

Theme 2: cues

Two studies described how intuition or 'instinct' influenced the conveyance decision.[61 69] That is, a feeling based on previous work or clinical experience became a lesson that informed later decisions.

Theme 3: use of decision support tools

Use of a decision support tool increased the conveyance of patients to a specific service for those who had suffered falls rather than to the ED.[61 74] No differences in eventual outcomes between the two referral options were found. The EMS staff indicated that experience and intuition had more influence on the conveyance decision than the standardised assessment tool, although high-risk patients who initially refused conveyance were more likely to agree if a checklist tool was used.[49]

Theme 4: input of significant others

Consulting a physician, either by the EMS staff or by the patient, influenced conveyance rates. When a patient initially refused transport to the hospital, contact with a physician could change the decision in favour of conveyance to the ED.[49 50 54] Telephone discussions between the paramedic, patient and an EMS physician led in one study to a major reduction in ED conveyance rate and in the median response time (from notification to ambulance back in service).[71] Another study similarly found that when EMS staff were unable to consult a physician, the patient was more likely to be conveyed to the ED.[63] Research investigating partnerships between general practitioners (GPs) and EMS staff showed that face-to-face contact between GP and patient led to lower conveyance rates than when the GP support was only by telephone.[67 76]

Consulting a colleague or other healthcare provider (members of teams specialising in falls) was also mentioned as a factor that could prevent unnecessary conveyance to the ED.[63]

Two studies reported that confident EMS staff were steered by the views of a patient (known to suffer from epilepsy) and believed that the patient understood their situation sufficiently well to be able to make the decision for themselves.[52 66]

When responding to patients in end-of-life situations, EMS staff would prefer to meet the wishes of the patient if a patient had the capacity for decision-making or if the situation was correctly documented.[66]

Finally, there is the influence of the dispatcher. EMS crews reported that the information provided by the dispatcher could frame their expectations and influence the decision-making.[63 73]

Theme 5: judgement

Judgement of contextual factors can be used to gather information to support decision-making. A decision to convey to the ED could be influenced by others. Strong reactions from family members, carers or bystanders were mentioned as a reason to prevent or stabilise a crisis and choose the safest option.[52 58 64] In addition, any dissatisfaction by the patient or their family due to a lengthy response time was mentioned as a factor leading to conveyance to alleviate the situation.[62]

Sometimes, paramedics can seek confirmation from their colleague, and one could be influenced by the other. There were also situations where the colleague had an alternative approach to theirs, including conveying patients against their perceived best interests.[66]

When non-conveyance is being considered as an option, the EMS staff take into account whether someone should and could be involved in taking further care of the patient. The presence of adequate care/carers was reported as having an influence on this decision.[61 69]

Conceptual framework

The process of data extraction and coding led to a small revision of the framework. The theme 'Decisions' was redefined as 'Input of significant others', in order to give a more accurate description of the factors found from the studies. 'Use of decision support tools' was added as a new theme. No factors were found related to the theme 'evaluation' and is therefore removed from the conceptual framework. Factors linked to 'outcomes' were displayed as objective and subjective outcomes. The revised conceptual framework is displayed in figure 3.

DISCUSSION

Summary of evidence

The main aim of this MSR was to provide insight and a deeper understanding of factors that influence the decision regarding conveyance of elderly patients to an ED after an emergency ambulance attendance. Further, we looked at both objective and subjective outcomes related to the conveyance decision such as the occurrence of

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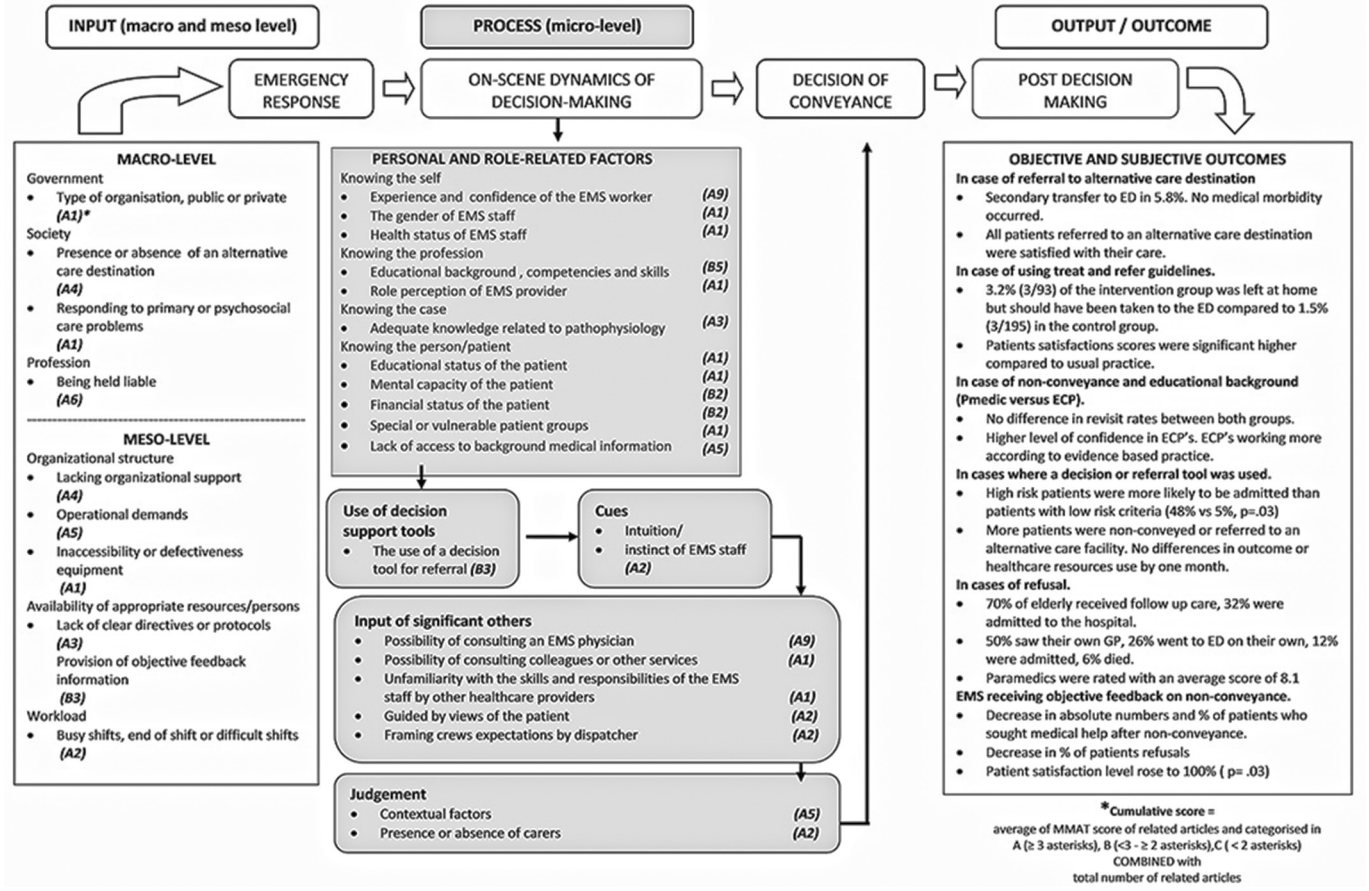

Figure 3 Conceptual framework of factors affecting the decision of ambulance service personnel regarding conveying adult patients to an emergency department. ED, emergency department; ECP, emergency care practitioner; EMS, emergency medical service; GP, general practitioner; MMAT, mixed-methods appraisal tool; Pmedic, paramedic.

undesirable outcomes and patient-reported outcomes. Findings are presented in an overarching framework that primarily reflects the relatively large influence of factors unrelated to a patient's condition on the conveyance decision.

Decisions over whether to convey someone to an ED after an emergency ambulance attendance often concern elderly people. An incorrect decision over an elderly person can lead to an increased risk of adverse or health-threatening effects as a result of chronic or multiple diseases, frailty, disability, polypharmacy and social isolation.[20 21 24 25 77] Consequently, we decided to focus on the elderly in this study. We found 8 of the 29 studies included in our review primarily focused on elderly patients. Most of the studies focused on elderly were related to conveyance decisions after a fall. The presence or absence of informal carers was mentioned as factor influencing the conveyance decision. In the absence of informal carers, elderly patients are likely to be taken to an ED even if there is no underlying life-threatening condition. These avoidable referrals to the ED can be hazardous, especially for vulnerable elderly people, and puts an additional strain on those treating a large number of acute admissions to the ED, and its resources, and also leads to higher healthcare costs.[38 78]

When broadening our scope and including all age groups, our first relevant finding is that the majority of factors that influence the conveyance decision are not determined by the direct contact between patient and EMS staff. Mainly on the macro and meso levels, and in personal and role-related factors, a variety of non-medical factors are influential. Our review of the literature shows that EMS staff are more likely to decide to convey a patient to the ED if they perceive a lack of organisational support, lack access to, or have defective, equipment, have counteracting performance indicators or sense that they are being held responsible for a patient's health. These findings indicate the relevance of patient-unrelated factors in conveyance decisions that might have a significant impact on patient safety, resource use and, ultimately, healthcare costs. Being held liable while, at the same time, experiencing insufficient organisational support and a 'shame and blame' culture can obstruct organisational learning and patient safety, whereas boosting the competences and working conditions of healthcare staff and leadership are known to increase the quality of healthcare.[79–81] When managers are aware that macro and meso factors can have a major impact on conveyance decisions, and act accordingly, EMS staff can make more effective and efficient decisions.

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Several factors, from both the EMS staff and patient perspectives, have been identified as affecting the conveyance decision-making process. Work experience, and its impact on the confidence of EMS professionals, was often cited as a factor that influenced the conveyance decision. Research on registered nurses in hospitals has similarly demonstrated a positive link between work experience and competence, and showed this had an influence on patient outcomes.[82] Higher education levels, permanent employment and participation in educational programmes also boosted employees' feelings of competence.[82] As such, investing in increasing the knowledge and skills needed to assess the elderly, and in the expanding options for non-emergency responses, would seem to pay off. Introducing EMS staff with additional specialised knowledge and competences regarding elderly care could improve on-scene care and avoid unnecessary ED admissions. Here, our MSR shows that EMS specialists were more likely to treat patients at the scene than paramedics, although there was little evidence in terms of different outcomes during the follow-up period.[53 73] Further exploring the effect of using EMS specialists in assessing, treating and referring elderly patients should be considered and linked to objective and subjective outcomes.

EMS staff can find it helpful if they can contact a physician in questionable and doubtful situations since this may provide EMS staff with the necessary medical information to make a correct referral decision. On the micro level, we saw that enabling EMS staff to consult a physician could increase the likelihood of conveying, possibly overlooked, high-risk patients and a decrease in unnecessary referrals of non-emergency cases to the ED.[49] There are also multiple studies that describe how contacting a physician (EMS physician or GP) has a positive influence in cases where a patient initially refuses transfer to the ED.[49 50 54] Facilities such as telecare and telehealth can support this consultation process and could be further investigated in order to improve the decision-making process.

A recent systematic review provided us with considerable data on the outcomes of a decision not to convey a patient to the ED.[16] The researchers concluded that, after non-conveyance, 6.1% of the patients again contacted EMS within 24 hours, and up to 19% visited an ED within 48 hours of the initial interaction. In our MSR, we found evidence that being able to refer to alternative care facilities, using EMS specialists (ECPs), using referral tools, providing objective feedback to EMS staff and enabling EMS staff to contact a physician were all feasible and safe options to increase the likelihood that patients received the right care in the appropriate place.

However, we also found several factors leading to referrals to the ED when alternative care destinations or non-referral could be a better option. Despite there being a lack of research on the proportion of patients being conveyed while not strictly requiring hospital care, previous research shows that such a decision comes with risks and disadvantages, such as increased pressure on the ED, longer and often overnight stays in the ED and hospital, which all add to costs.[21 23–25 38] To improve the future quality of EMS responses, more data are needed on avoidable conveyance decisions, in terms of the actual numbers, and subsequent research on how to reduce this.

LIMITATIONS

A possible weakness is that the factors identified cannot be assumed to relate to elderly people because, in many studies, the elderly were just part of a broader study population, and the results were not specified by age group. In addition, the low methodological quality in some of the studies and the considerable age of some of them are also limitations of the study.

CONCLUSIONS

Making a decision to convey an elderly person to the hospital after an emergency ambulance response is not only determined by the assessment of medical conditions, but additional factors also influences this decision. These factors should be taken into account when new guidelines are being developed, or when new research is conducted into conveyance decisions, to ensure that greater insight will be developed on how multiple factors and their interplay influence the conveyance decision. Given the rapidly increasing number of vulnerable elderly individuals, it is, from both social and medical perspectives, highly relevant that EMS responses avoid unnecessary hospitalisation, and that evidence is provided to support future safe conveyance guidelines.

IMPLICATIONS FOR FUTURE RESEARCH

The low methodological quality in some of the studies, the considerable age of some of them and the broader population covered in many of them mean that further research focused on exploring the factors found in this review within EMS practice and the population of elderly people is warranted. In addition, study could be carried out to quantify the occurrence of preventable admissions to EDs based on the factors identified in this review.

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Acknowledgements We would like to thank Giles Stacey for his detailed comments on the manuscript.

Contributors All the authors contributed to the study design. Data were collected and selected by JO, DS and MB. Critical appraisal of all the selected articles was divided among PR, DS and MB. JO independently reviewed all the articles and results were compared. Agreement on a definitive appraisal was obtained by discussion. The manuscript was drafted by JO in close collaboration with MB and SB. All the authors approved the final manuscript before submitting.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement Additional documentation on the data-collection process and appraisal is available from the corresponding author on reasonable request.

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